PERFORMANCE WORK STATEMENT

National Academy of Sciences (NAS)

Contract #68HERC19D0011

PR-ORD-21-02523

Task Order #68HE0CXXFXXXX

I. TITLE: The Role of Companion Animals as Sentinels for Predicting Environmental Exposure Effects on Aging and Cancer Susceptibility in Humans: A Workshop

II. Task Order Contracting Officer Representative(s):

Task Order Contracting Officer Representative (TOCOR) **Name: Elizabeth Sams** **Office: ORD/IOAA** **Phone:** 919-541-3417 **Email:** sams.elizabeth@epa.gov	**Alternate Task Order Contracting Officer Representative (Alt. TOCOR)** **Name: Tia Groves** **Office: ORD/IOAA** **Phone:** 202-564-5709 **Email:** groves.tia@epa.gov

III. PERIOD OF PERFORMANCE: Date of task order award through 6 months following award.

IV. PURPOSE OF TASK

The purpose of this task order is to plan and organize a workshop that will examine the potential role of companion animals as sentinels of relevant, shared environmental exposures that may affect human aging and cancer.

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This National Academy of Sciences (NAS) workshop will explore the opportunities and challenges for using this novel translational approach to exposure science as a way to accelerate the knowledge turn in this evolving field. The workshop will feature invited presentations and panel discussions on topics that may include:

- Potential data sources needed to assess whether companion animals may serve as sentinels for human environmental exposures.
- The state of the science for biomarkers of exposure and use of biosensors for application to companion animal populations of interest.
- Best practices for collection, storage, and analysis of biosamples to assess exposures (eg., biorepository resources, DNA susceptibility, DNA methylation, microbiome, etc).
- Strategies for standardizing, sharing, and aggregating health records and relevant metadata across species.

- Current policies and regulations related to monitoring and mitigating environmental exposures and the role for prospective interventions based on companion animal data.

V. BACKGROUND

The One Health movement aims to focus attention and resources on the critical interconnectedness of animal, human, and environmental health and to promote improved multidisciplinary collaboration. This concept offers a promising and underutilized pathway for future research with the potential to improve both animal and human health. For example, pets share the environment of their human companions so environmental exposure data collected on pets has the potential to provide new insights that are complementary to traditional research approaches.

Much research has recently focused on spontaneous cancers in pet animals, particularly dogs, and their similarities with human cancers. Spontaneous canine cancers develop as a result of normal aging, genetic alterations and environmental exposures and exhibit long latency, genomic instability, and heterogeneity of tumor cells and the surrounding microenvironment. In addition, they share many characteristics with human cancers, such as histological appearance, tumor genetics, biological behavior and molecular targets. Clinically, cancers in pet dogs develop acquired resistance, recurrence, and metastasis, like human cancers. Collection and analysis of exposure data on companion animals may provide important insights into environmental risk factors for cancer. A classic example of a pet animal sentinel is the diagnosis of canine mesothelioma and potential human exposure to asbestos. One study found that asbestos exposure due to an owner's occupation or hobby was a significant risk factor that accounted for most canine mesothelioma diagnoses in pet dogs.

Another example is canine invasive bladder cancer. This form of cancer has been investigated as a relevant model for human urothelial cancer. Exposure to environmental herbicides and strong flea/tick medications represent risk factors in breeds strongly predisposed to bladder cancer. Interestingly, consumption of vegetables with regular dog food was associated with reduction in invasive bladder cancer risk. Reduced risk and improved survival were demonstrated in humans with bladder cancer and cruciferous vegetable intake in subsequent studies independent of other confounding risk factors.

The Golden Retriever Lifetime Study (GRLS) and the Dog Aging Project (DAP) provide proof of principle for longitudinal one health research. The purpose of these large, prospective U.S. canine health studies is to identify the nutritional, environmental, lifestyle and genetic risk factors for cancer, aging and other diseases in dogs with translational impact for human health. Such work may serve as a template for designing hypothesis driven research to define gene-environment interactions and age-related outcomes such as cancer.

This NAS workshop and the concept of One Health is one that is germane to all of ORD and is a movement that is supported by many scientists in ORD. This workshop would collect input from other scientists on how to conduct the study to get the most valuable information and form objectives. Participants in this type of workshop acquire a much broader understanding

of what can be accomplished with these types of studies, and they participate in collegial and creative interchanges that spark new avenues of exploration benefiting the Agency or lead to refinements of current research. This type of workshop also encourages discussion and collaboration that includes people in this research area, strengthening the Agency's relationship with other institutions and stakeholders and expanding the informational resources for EPA. Supporting the New Approach Methods program (NAM) has scientific merit, and would also send a signal to our staff that like them ORD management views the integration of human and animal health as important concept.

VI. SCOPE OF WORK

The National Academies of Sciences, Engineering, and Medicine shall convene an expert planning committee to develop a public hybrid attendance workshop that includes both virtual and in-person attendance. In person attendees will meet at the NAS Keck Building located at 500 5th Street NW, Washington DC 20001. The expertise of the NAS workshop planning committee should reflect the expertise of the workshop invitees. Following its normal practice, the National Academies shall solicit suggestions from a wide variety of sources.

VII. DESCRIPTION OF TASKS

Task 1: Hybrid Attendance Workshop on [HYPERLINK "https://www.nationalacademies.org/event/12-01-2021/the-role-of-companion-animals-as-sentinels-for-predicting-environmental-exposure-effects-on-aging-and-cancer-susceptibility-in-humans-a-workshop"]

NAS shall plan and organize a workshop that will examine the potential role of companion animals as sentinels of relevant, shared environmental exposures that may affect human aging and cancer.

Subtask 1.1 – Establish a workshop planning committee:
NAS shall convene an expert planning committee to develop the public hybrid workshop. The expertise of the NAS workshop planning committee should reflect the expertise of the workshop invitees. Following its normal practice, the National Academies shall solicit suggestions from a wide variety of sources.

The planning committee will bring together experts from urban sustainability, city planning, local public and private infrastructure providers, asset management, and infrastructure investment communities with statisticians, data scientists, mathematicians, economists, computer scientists, and artificial intelligence/machine learning experts. In addition to experts in humanities, social sciences, and public policy to share ideas, best practices, and opportunities.

Subtask1.2. – Conduct workshop:

The NAS workshop shall be webcast and available to the public. Videos shall be recorded and stored on NAS website for additional viewing. Hosting and organization of a public workshop with broad audience attendance. The workshop will be 2-2 ½ days in length.

Subtask 1.3. – Develop Workshop Output:

NAS shall prepare the "Proceedings of Workshop" report reflecting committee findings on the research topics covered at the workshop. The final electronic report shall be delivered to the TOCOR, Contracting Officer (CO), and Contract Level CO Representative (CL-COR) 120 days following the conclusion of the workshop. The EPA will review the report within 21 days and accept it. If any factual inaccuracies are found the NAS shall address them before the report is accepted.

Task 1. Deliverables

Task	SubTask	Deliverable	Schedule
	1.1	Establish planning committee	Within 14 calendar days of the date of task order award.
	1.2	Conduct Workshop	Workshop dates December 1-3
	1.3	Proceedings of Workshop report	120 days following workshop

VIII. Acceptance Criteria

NAS shall prepare and deliver electronic word documents and Prepublication and Final Workshop Report that are technically accurate, complete, timely, grammatically correct, and free of grammatical and spelling errors. These documents and reports shall conform to the specific task, charge, expertise, and deliverables of the Task Order.